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# Research & Development

MARCH 1985

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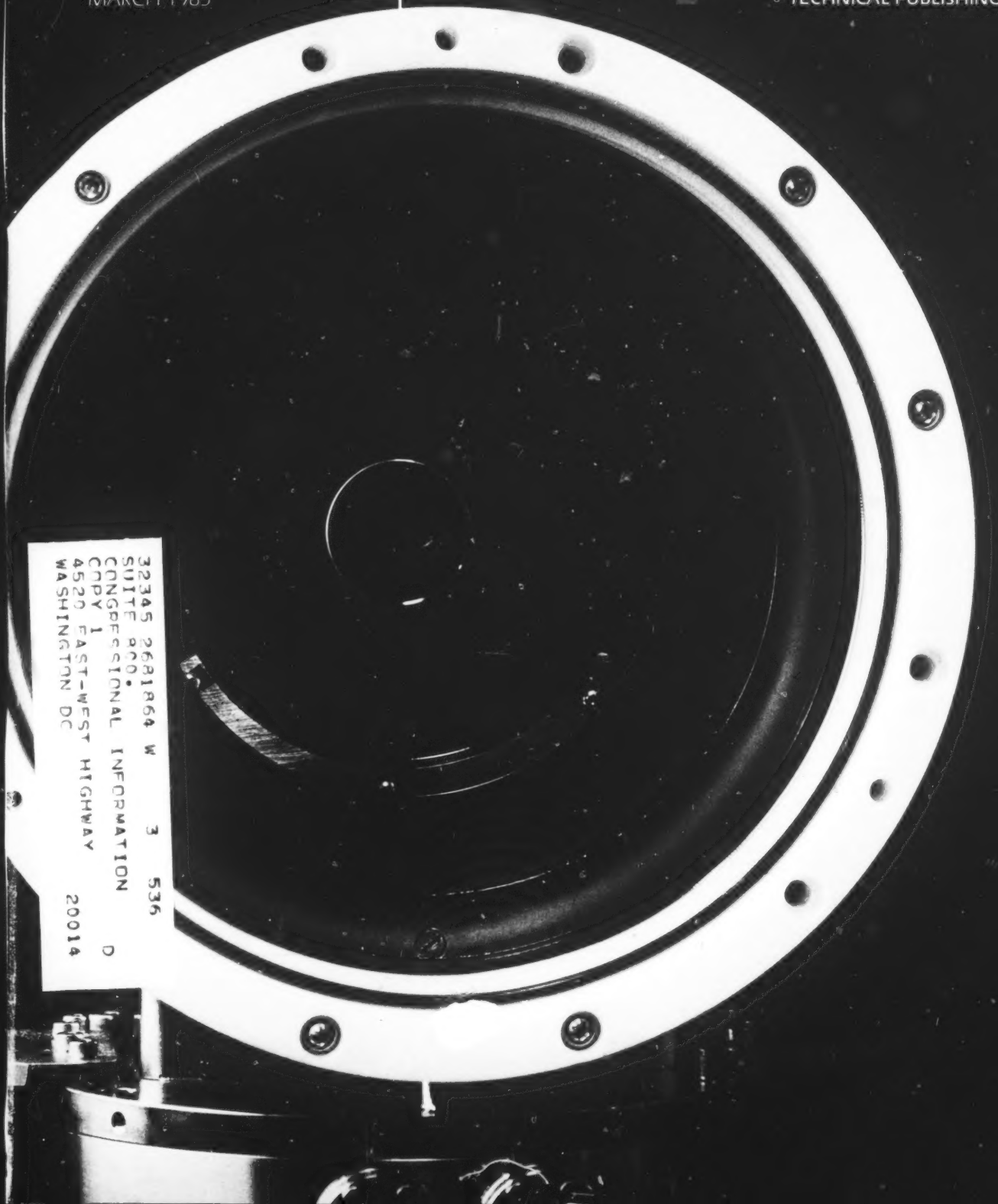

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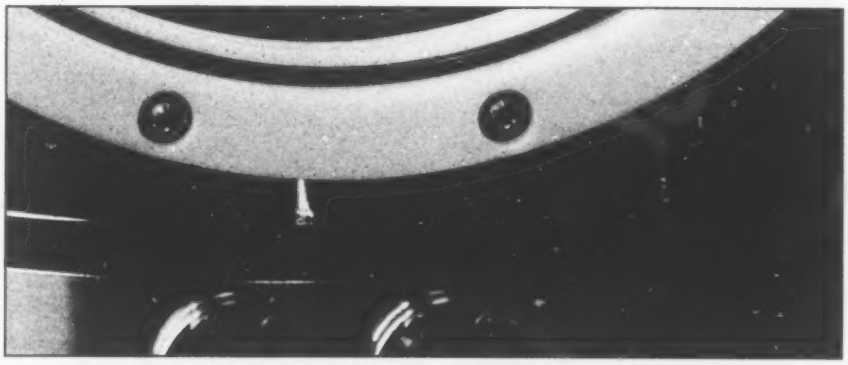
# Research & Development

SERVING THE $202-BILLION WORLDWIDE R&D INDUSTRY


**Better magnetic storage disks. See p 111.**



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ABOUT THE COVER

Increasing the amount of information that can be magnetically stored per in.$^2$ of media is of primary importance to the computer industry. A large part of this technology depends on how well the magnetic material is sputtered onto the substrate. To meet an industry need for a reliable production system, R&D scientists at Varian Associates Inc., Palo Alto, CA, developed the MDP-1000 disk sputtering system.

Maximum system throughput is 180 disks/hr. Each disk is treated individually in up to six separate process chambers, one of which is shown in the cover image. The system is described in detail in an article that begins on p 111.

Cover photo for this issue by Peter Nuding Photography.

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# 1984 was a good year for R&D salaries

*Pay increases, mainly in the 2- to 9%-range, with inflation near 4%, bring substantial buying power gains to applied scientists whose U.S. incomes now exceed $24 billion.*

**Robert R. Jones,** Editor

YOUR WALLET OR PURSE is a little bit heavier now than it was at this time a year ago if you are typical of the nearly 3,700 readers of this magazine who responded to our annual survey of the industry. Because salary increases substantially exceeded inflation for research and development scientists and engineers in the United States last year, you probably have a little something left at the end of each month—or you are enjoying an enhanced standard of living that the increased buying power has made possible in recent months.

As a generalization, this year's annual profile of our industry is more upbeat than several recent ones. In fact, it was an up year for R&D in a number of important ways.

The salary range continues to expand, as it has for several years, with the upper end climbing while the lower end remains essentially unchanged (putting the lie to a hint last year that the lower end had begun to climb).

One bit of explanation is necessary for those of our readers who have followed previous reports in detail or who plan to make comparisons with previous years. Our salary scale was established with $3,000 spans—$16,000 through $18,000, $19,000 through $21,000—in the years when our top income figure was below $50,000. As we added a span or two each year and reached the $70,000 level last year, the number of spans in our report became burdensome.

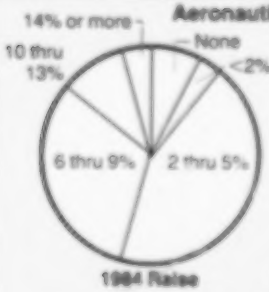
This year we made a break, albeit at the short-term cost of losing some direct comparisons that we have been making over the years. This year the spans cover $5,000, *e.g.*, $15,000 through $19,000. This will permit more-presentable charts and tables and, in a few years, a resumption of the annual direct comparisons of span to span. Even now, if you read on, you will see that a vast number of comparisons and correlations remains.

### 1.5% get more than $75,000

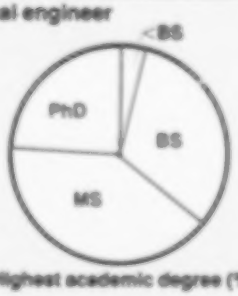
Where last year's lowest salary level surveyed was "less than $16,000," this year's was "less than $15,000." The portion of respondents in that bottom income level was the same as for last year's bottom level, 1.6%. And, as mentioned, the range expansion is upward, with the result that the new top level annual income of "$75,000 or more" is occupied by 1.5% of the respondents.

At the beginning of this decade, 4% of our respondents listed an annual salary of $46,000 a year or more. The most populous single salary span that year (1980) was $25,000 through $27,000. By last year, the portion

## Aeronautical engineer



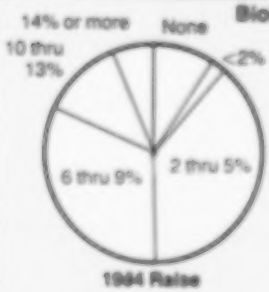

1984 Raise




Highest academic degree (%)

| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 1.8%<br>>$75,000 = 1.8 | Median<br>$49,330 |
| Years with present employer: | < 1 yr = 3.6%<br>>36 yr = 0.0 | Median<br>15.95 yr |
| Age of respondents: | <26 yr = 0.0%<br>>65 yr = 0.0 | Median<br>50.92 yr |
| Years of experience: | < 1 yr = 0.0%<br>>40 yr = 5.4 | Median<br>26.52 yr |

## Biologist

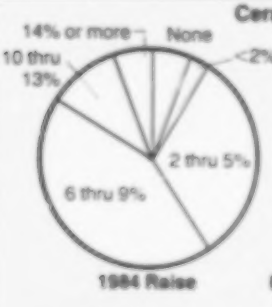



1984 Raise

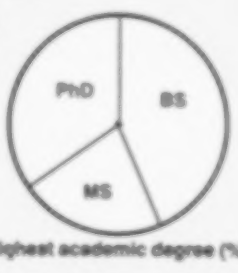
Highest academic degree (%)

| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 1.8%<br>>$75,000 = 0.4 | Median<br>$34,950 |
| Years with present employer: | < 1 yr = 3.5%<br>>36 yr = 0.4 | Median<br>9.15 yr |
| Age of respondents: | <26 yr = 0.0%<br>>65 yr = 2.2 | Median<br>39.80 yr |
| Years of experience: | < 1 yr = 0.0%<br>>40 yr = 0.9 | Median<br>12.90 yr |

## Ceramist



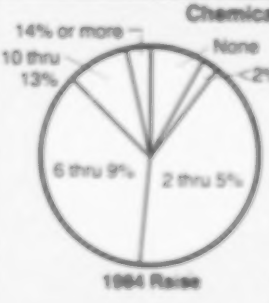

1984 Raise




Highest academic degree (%)

| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 0.0%<br>>$75,000 = 3.1 | Median<br>$43,450 |
| Years with present employer: | < 1 yr = 7.6%<br>>36 yr = 1.5 | Median<br>8.45 yr |
| Age of respondents: | <26 yr = 4.5%<br>>65 yr = 1.5 | Median<br>40.08 yr |
| Years of experience: | < 1 yr = 0.0%<br>>40 yr = 0.0 | Median<br>16.38 yr |

## Chemical engineer

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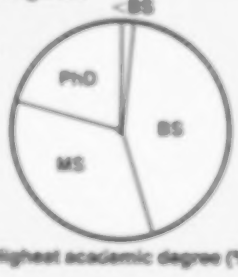
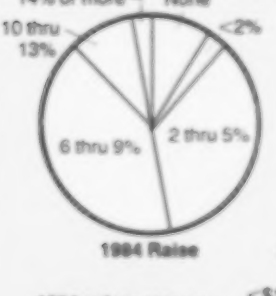



Highest academic degree (%)

| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 1.6%<br>>$75,000 = 1.2 | Median<br>$42,390 |
| Years with present employer: | < 1 yr = 2.7%<br>>36 yr = 2.3 | Median<br>10.06 yr |
| Age of respondents: | <26 yr = 3.5%<br>>65 yr = 1.6 | Median<br>40.87 yr |
| Years of experience: | < 1 yr = 0.4%<br>>40 yr = 1.6 | Median<br>16.59 yr |

## Chemist

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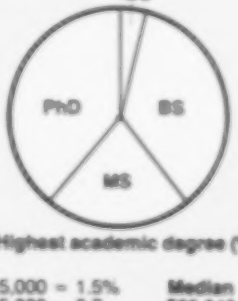
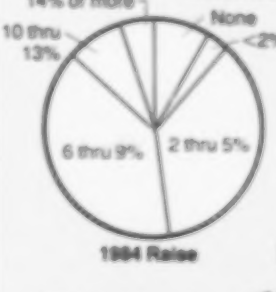


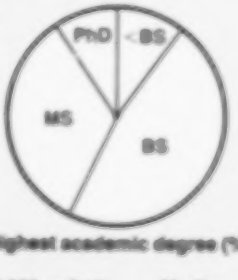

Highest academic degree (%)

| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 1.5%<br>>$75,000 = 0.7 | Median<br>$39,040 |
| Years with present employer: | < 1 yr = 4.2%<br>>36 yr = 1.1 | Median<br>9.93 yr |
| Age of respondents: | <26 yr = 2.2%<br>>65 yr = 1.2 | Median<br>41.04 yr |
| Years of experience: | < 1 yr = 0.7%<br>>40 yr = 1.8 | Median<br>14.47 yr |

## Electrical engineer



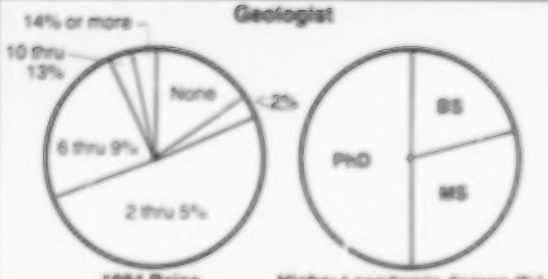

1984 Raise




Highest academic degree (%)

| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 3.1%<br>>$75,000 = 1.8 | Median<br>$42,910 |
| Years with present employer: | < 1 yr = 4.3%<br>>36 yr = 1.8 | Median<br>11.01 yr |
| Age of respondents: | <26 yr = 2.8%<br>>65 yr = 1.8 | Median<br>45.39 yr |
| Years of experience: | < 1 yr = 0.6%<br>>40 yr = 2.1 | Median<br>21.72 yr |

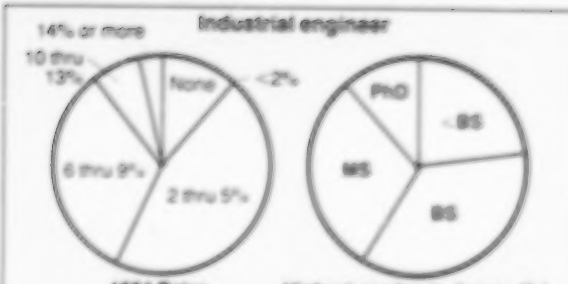
## Geologist




1984 Raise — Highest academic degree (%)

| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 5.4%<br>>$75,000 = 7.1 | Median $41,830 |
| Years with present employer: | < 1 yr = 7.1%<br>>36 yr = 1.8 | Median 8.28 yr |
| Age of respondents: | <26 yr = 0.0%<br>>65 yr = 0.0 | Median 46.50 yr |
| Years of experience: | < 1 yr = 3.6%<br>>40 yr = 1.8 | Median 19.09 yr |

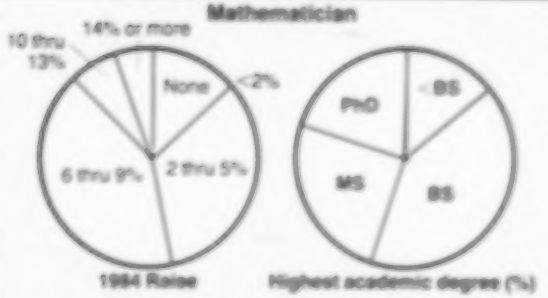
## Industrial engineer




1984 Raise — Highest academic degree (%)

| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 0.0%<br>>$75,000 = 0.0 | Median $38,280 |
| Years with present employer: | < 1 yr = 7.1%<br>>36 yr = 2.4 | Median 10.70 yr |
| Age of respondents: | <26 yr = 2.4%<br>>65 yr = 0.0 | Median 47.64 yr |
| Years of experience: | < 1 yr = 0.0%<br>>40 yr = 4.9 | Median 22.14 yr |

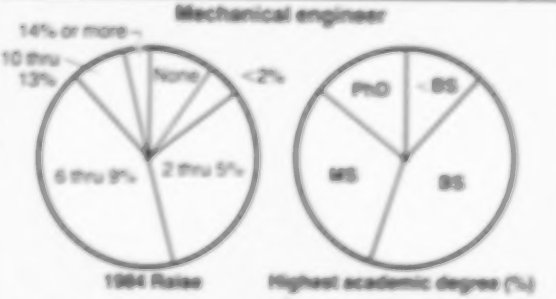
## Mathematician




1984 Raise — Highest academic degree (%)

| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 0.0%<br>>$75,000 = 6.7% | Median $51,200 |
| Years with present employer: | < 1 yr = 6.7%<br>>36 yr = 0.0 | Median 12.95 yr |
| Age of respondents: | <26 yr = 0.0%<br>>65 yr = 6.7 | Median 48.00 yr |
| Years of experience: | < 1 yr = 0.0%<br>>40 yr = 13.3 | Median 24.60 yr |

## Mechanical engineer




1984 Raise — Highest academic degree (%)

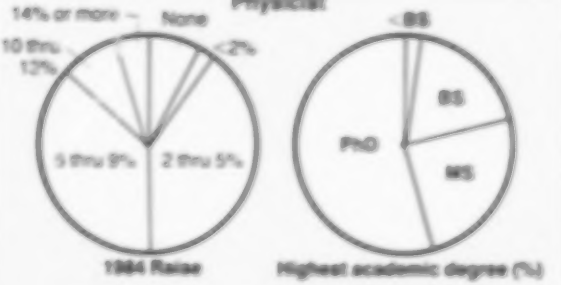
| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 0.3%<br>>$75,000 = 2.0 | Median $42,160 |
| Years with present employer: | < 1 yr = 2.6%<br>>36 yr = 1.5 | Median 10.05 yr |
| Age of respondents: | <26 yr = 2.3%<br>>65 yr = 1.7 | Median 44.45 yr |
| Years of experience: | < 1 yr = 0.6%<br>>40 yr = 4.1 | Median 18.70 yr |

## Metallurgist

1984 Raise — Highest academic degree (%)

| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 1.1%<br>>$75,000 = 2.6 | Median $44,580 |
| Years with present employer: | < 1 yr = 5.3%<br>>36 yr = 0.0 | Median 10.22 yr |
| Age of respondents: | <26 yr = 2.1%<br>>65 yr = 1.1 | Median 43.07 yr |
| Years of experience: | < 1 yr = 0.5%<br>>40 yr = 1.1 | Median 17.35 yr |

## Physicist




1984 Raise — Highest academic degree (%)

| | | |
|---|---|---|
| 1984 salary range: | <$15,000 = 0.3%<br>>$75,000 = 1.2 | Median $43,120 |
| Years with present employer: | < 1 yr = 7.0%<br>>36 yr = 0.0 | Median 10.62 yr |
| Age of respondents: | <26 yr = 1.2%<br>>65 yr = 2.1 | Median 43.56 yr |
| Years of experience: | < 1 yr = 0.9%<br>>40 yr = 1.5 | Median 17.42 yr |

of respondents earning $46,000 or more was 25.1%, with the most populous span being $34,000 through $36,000.

Today, 35.1% of our respondents report annual salaries of $45,000 or more and the most populous span is $40,000 through $44,000, with 15.7% of the respondents occupying it.

Not too surprisingly, the median income for this year's respondents falls in that range at $40,180, up 6.3% from last year's $37,800. This rate of increase is close to 1981's and 1982's of 7.8% and 7.7%, but well above last year's increases (given in 1983) of 4.2%. More to the point is the fact that the 1984 increases that are in effect now follow low inflation rates, whereas the 1981 and 1982 increases followed much higher rates of inflation.

### Industry payroll $24 billion

One result of these rising figures is that you are a member of an affluent demographic segment. Workers in research, development, and quality assurance in the United States will draw an annual paycheck in 1985 of $24.1 billion, up impressively from $18.9 billion in 1984.

It is needless to say that as a consequence of all of this, the median salary of R&D workers has moved up accordingly. Rather than just say it, let's set it out in the following table.

**Increases in salary, all levels R&D**

| | % of respondents | | | | |
|---|---|---|---|---|---|
| Amount | 1985 | 1984 | 1983 | 1982 | 1981 |
| None | 9.3 | 10.3 | 14.7 | 6.3 | 5.2 |
| Less than 2% | 2.9 | 2.1 | 1.8 | 1.2 | 0.9 |
| 2 thru 5% | 26.6 | 26.9 | 15.9 | 10.6 | 6.0 |
| 6 thru 9% | 37.6 | 38.9 | 34.3 | 34.5 | 45.2 |
| 10 thru 13% | 10.1 | 11.5 | 25.1 | 34.0 | 29.7 |
| 14% or more | 3.6 | 4.4 | 8.3 | 13.3 | 11.0 |
| Ahead of inflation | 63.3 | 54.8 | 33.4 | 47.3 | 40.7 |

The table shows that buying power has increased for R&D workers as a group. Two out of every three workers did better than just stay even with inflation. This is true even though the percentages in the upper salary increase levels are much lower than they were in the early part of this decade. A much lower inflation level explains what at first appears to be contradictory.

The portion of respondents receiving no salary increase last year has dropped off sharply from preceding years, having climbed steadily from 5.2% in 1981's report to 16.3% in last year's. Now it is back down to 9.3% (including, of course, a substantial percentage of new hires).

The most impressive salary increase performance came from the ceramists with 60% getting raises of 6% or more last year. They were followed by mechanical engineers, mathematicians, and chemists (last year's leader), all closely bunched at 53.6%, 53.4%, and 52.7%. Geologists were at the low end of this group with 32.2% getting salary increases of 6% or more.

Details of this year's salary increases and those for five other salary parameters are displayed in charts for 12 disciplines accompanying this article. These charts present an opportunity for you to make comparisons by disciplines, education, age, experience, and longevity, using information that is available nowhere else.

Looking at median salaries by disciplines, mathematicians held onto first place with a 14.4% increase over last year. Aeronautical engineers and ceramists made strong gains. The smallest improvements in median salaries were recorded by biologists and geologists with both losing rank in the comparison table.

**Rankings for disciplines by median salary**

| Rank | | | Median salary | | |
|---|---|---|---|---|---|
| 1985 | 1984 | Discipline | 1985 | 1984 | % increase |
| 1 | 1 | Mathematician | $51,200 | $44,750 | 14.4 |
| 2 | 2 | Aero. Engr. | 49,330 | 43,550 | 13.3 |
| 3 | 3 | Metallurgist | 44,580 | 41,310 | 7.9 |
| 4 | 9 | Ceramist | 43,450 | 39,200 | 10.0 |
| 5 | 5 | Physicist | 43,120 | 40,770 | 5.8 |
| 6 | 8 | Elec. Engr | 42,910 | 39,240 | 9.4 |
| 7 | 6 | Chem. Engr. | 42,390 | 40,140 | 5.6 |
| 8 | 7 | Mech. Engr. | 42,180 | 40,010 | 5.4 |
| 9 | 4 | Geologist | 41,830 | 40,950 | 2.1 |
| 10 | 10 | Chemist | 39,040 | 36,510 | 6.9 |
| 11 | 11 | Indust. Engr. | 38,280 | 36,280 | 5.5 |
| 12 | 13 | Other | 35,190 | 33,480 | 5.1 |
| 13 | 12 | Biologist | 34,950 | 33,660 | 3.8 |

There continues to be a premium on age, experience, and advanced degrees. As one result, the median age of respondents to our survey has moved steadily upward, with the median age in 1980 being 40.4 years, followed by 40.9, 40.9, 41.4, 41.5, and this year's 42.0.

Likewise, the median years of experience for our respondents has increased from 15.8 years in 1982 to this year's 16.5.

### Dollars for experience

When salary is correlated to experience, this premium for experience becomes more obvious. For this year's respondents with less than a year's experience, the median income is $27,020. Median for those with one through five years is $30,380. For six through 10, it is $35,030, and so it goes to a median annual salary of $47,210 for those with more than 40 years' experience.

The percentage of respondents with PhD degrees has moved from 27.6 in 1980 with only one hesitation (in 1983) to its present 33.1%. Geologists no longer lead the disciplines in the percentage with a PhD, having been crowded out of first place by the physicists with 53.4%. Biologists are second with 51.8% followed by the formerly leading geologists at 50.0%.

There is a substantial gap from the geologists to the fourth-place discipline, chemists at 39.8%. They are followed by metallurgists at 37.6 and ceramists at 33.8. Electrical engineers have the lowest percentage of PhDs at 9.5.

When masters degrees and doctorates are considered together and the disciplines are ranked for advanced degrees, geologists lead with 78.6% having an advanced degree. Biologists are next at 78.1, followed by physicists, 77.6; metallurgists, 66.2; and aeronautical engineers, 62.5.

In the second part of this report, we will look into the implications of some of the above conclusions and also report on the value of an advanced degree to its holder, relative salary scales of men and women, and the advantages in salaries for jobs in industry, government, or university. R&D

# Research Development

MAY 1985

TECHNICAL PUBLISHING

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1985 Laboratory of the Year

Research & Development

SERVING THE $202-BILLION WORLDWIDE R&D INDUSTRY

**Work in a 'people place.' See p 90.**

EDITORIAL

**11 That deficit must go!**

DEPARTMENTS

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ABOUT THE COVER

"I would enjoy working there. I think that my work there would be really productive . . . " The GE Plastics Technology Center in Pittsfield, MA, is *Research & Development* magazine's 1985 Laboratory of the Year.

The facility was designed to promote communications by identifying the special relationships between labs, and providing public places for informal interdisciplinary discussions by technical workers, scientists, and managers.

The three sections of the lab are joined by barrel-vaulted corridors and galleria. The curved lines are carried over into the center's landscaping and access roads.

High Honors go to the Exxon Research & Engineering Co.'s Research & Headquarters Facility, Annandale, NJ.

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ABP BPA

# R&D INCOME WINNER: MALE PhD IN INDUSTRY

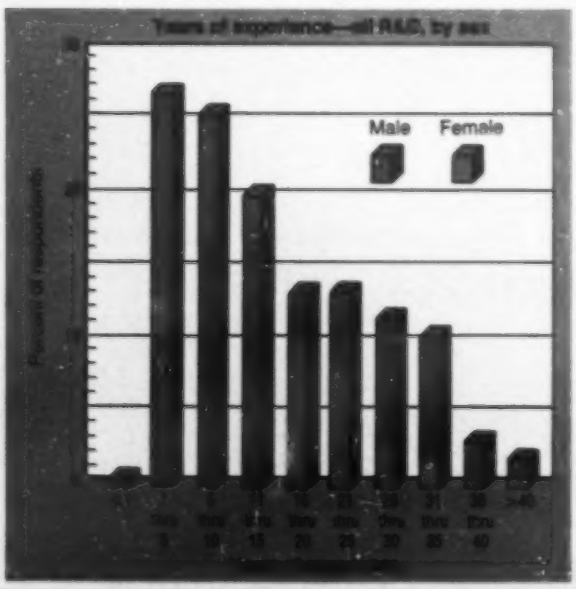
*Career premium for doctorate increases substantially; women lag in salary sweepstakes, but are closing the gap.*

**Robert R. Jones,** Editor

THE LARGE NUMBERS that the R&D industry associates with PhD salaries got substantially larger last year, and the salary advantages of other levels of education reflect similar industry response.

To the extent that the nearly 3,700 respondents to our recent survey of the R&D industry are representative, we can say that the research and development scientist or engineer with a doctoral degree can expect a career income advantage of $715,000 over his R&D colleague who did not go beyond the baccalaureate level. This figure compares to the $620,000 derived from our survey last year.

Respondents to our survey have made it clear that the net value of a PhD over a BS depends on an individual's field of endeavor and sex, and whether the employer is from industry, academia, or government. Considering that the figure cited above is based on a median for our respondents, it is easy to see that many PhDs will show much larger benefits than this from their doctorates.




The $715,000 career benefit figure is what remains after we deduct costs of the added education and allow for the additional years spent in school. We assume that the holder of the PhD will work 25 years after getting that degree, a figure that our survey shows is conservative. If the comparison were extended to show a 35-year work career, the difference in income would increase markedly, because returns to experience are substantial in the latter years of a career, as we demonstrated in the first part of this article in March.

However, sticking with the conservative 25 years for the PhD, we allow a 30-year career for the person who enters the work force after getting a BS. Assuming a 10% interest rate prevailing over the 25-year career of the PhD and allowing $300,000 for tuition, missed earnings, etc., we then can make appropriate projections. From this comes the PhD's career benefit figure.

Using similar calculations with different allowances for earning years and expenses, we find that the present career value of a PhD over an MS is $470,000, just $100,000 higher than it was a year ago.

For the high school graduate who is wondering about college, the message is, "Go for it!" The net career benefit for a BS over less-than-BS is a cool half million dollars—cool, because that figure is rounded off from the $565,000 indicated from our responses. And we would point out to that high schooler that the less-than-BS person that we are comparing here had to be able to get a job in R&D and qualify as a researcher in order to be included in this survey at all.

*"Raises, schmaizes, Dean Oberholdt! Our women researchers still get only three-fourths of what they would get in industry!"*

Separate from the personal benefits that accompany a bachelor degree, the extra two, three, or four years necessary to go from less-than-BS to having that diploma would return to a typical individual a minimum of $141,000 per year invested.

Adding an MS to the BS is worth another $250,000 over a career, or roughly $8,000 every year. And the benefit of PhD over less-than-BS over the PhD's 25-year career works out to more than a million dollars ($1,092,000 compared to $875,000 last year).

And there are other interesting and helpful conclusions that can be drawn from our survey of salaries in relation to highest academic degree, as you will see in this table:

**Salaries compared by academic degrees**

| Degree | Median salary 1985 | Median salary 1984 | Percent change | Annual difference* 1985 | Annual difference* 1984 | Difference increase (percent) |
|---|---|---|---|---|---|---|
| Doctorate | $45,720 | $43,200 | +5.8 | $5,280 | $5,280 | +17.4 |
| Master | 39,520 | 37,920 | +4.2 | 3,180 | 3,210 | − 0.9 |
| Bachelor | 36,340 | 34,710 | +4.7 | 4,870 | 3,760 | +29.5 |
| <Bachelor | 31,470 | 30,950 | +1.7 | | | |

*Difference above next-lower degree

As has been true in recent years, the income advantages of baccalaureate and advanced degrees have been increasing faster than the rate of inflation. Last year the median income for less-than-BS did not keep up with inflation. Thus, the advantage for a PhD over less-than-bachelor in annual income increased to $14,250 last year from $12,250 the year before.

Reference was made earlier to the fact that these are all median figures, and that many PhDs will earn substantially more than the figures cited. By the same token, there will be some who earn substantially less, and a large portion of those will be women.

As we have pointed out for a number of years, women who work in research, development, and quality assurance earn a lot less than men do. That is not to say that they always earn less for equal work. For many reasons the female work force cannot be compared directly to their male counterparts.

Because of differences in opportunities, women almost always have less experience than men in R&D and QA. They usually have less time with their present employers, and they usually have less education. Thus, the higher paying jobs tend to be occupied by males with advanced degrees and substantial work experience.

When all of the differences are balanced out, we find that the male R&D worker in industry is earning a median annual salary of $41,750 in contrast to the female worker in a university where the median salary is $24,040.

Looking at salaries for workers in R&D and QA by sex and workplace, we find important differences from government to industry to university. One important change here is that government has recently relinquished some of its traditional salary leadership to industry. This first occurred last year.

Another important difference in salary ranges is that the lowest male median still exceeds the highest female median. The rankings are as follows:

| | 1985 | 1984 | % gain |
|---|---|---|---|
| Men in industry | $41,750 | $39,200 | 6.5 |
| Men in government | 40,400 | 38,630 | 4.6 |
| Men in universities | 38,040 | 32,580 | 16.8 |
| Women in industry | 31,590 | 29,590 | 6.8 |
| Women in government | 33,130 | 29,450 | 12.5 |
| Women in universities | 24,040 | 20,450 | 17.8 |

In this year's survey, the median annual income for all males is $40,990, up from $38,440 last year, and for all females it is $31,130, compared to last year's

$28,990; a 6.6% gain for males and 7.4% for females.

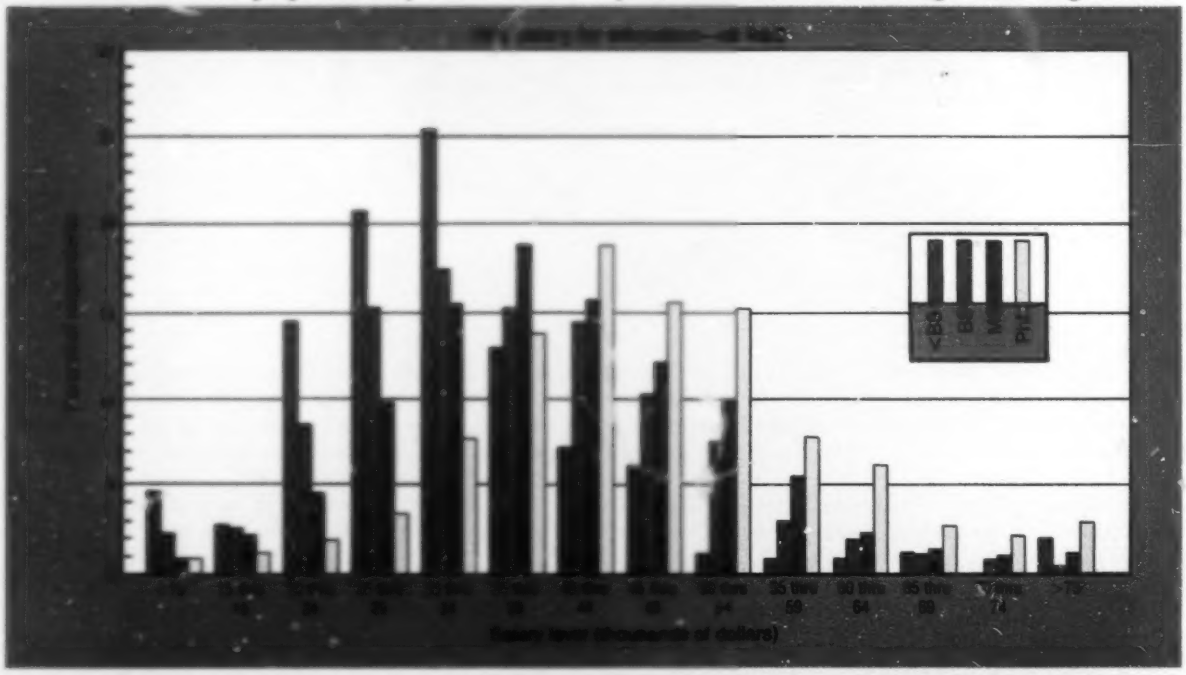
As we mentioned when comparing salaries by sex, the long-standing practice of government agencies paying the highest salaries for comparable work has changed. It is too early to say that it has ended, but in any case we can look at these comparisons for all respondents:

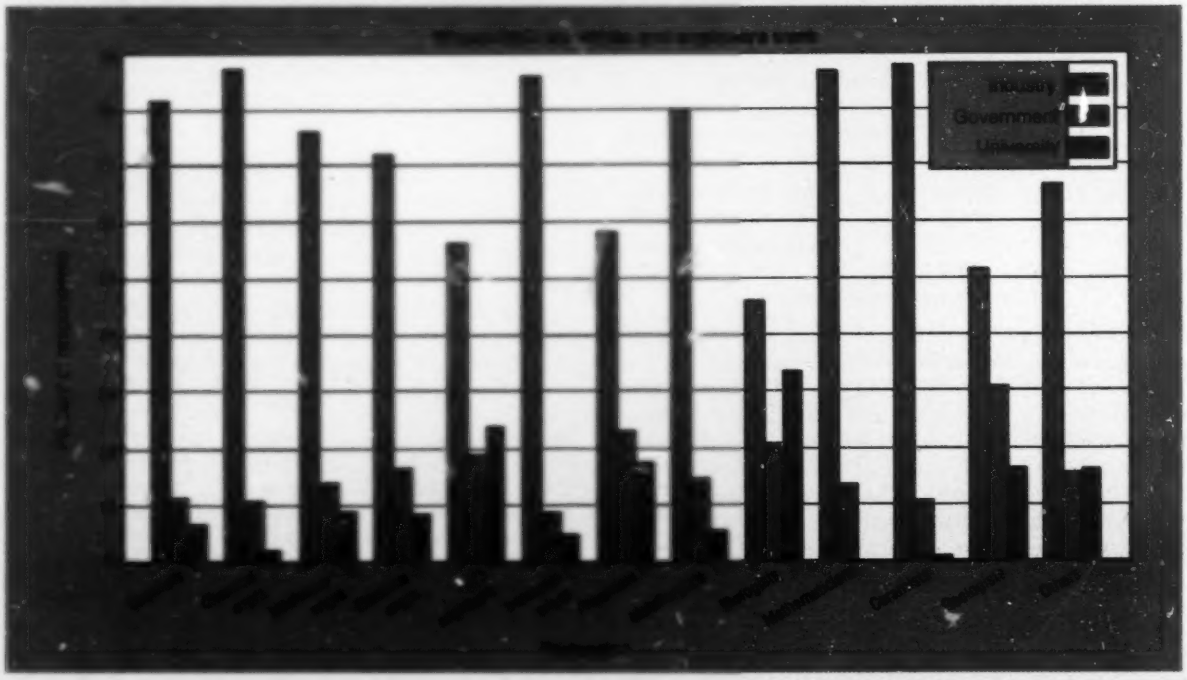
**Median salaries all R&D by workplace**

| | 1980 | 1984 | 1985 |
|---|---|---|---|
| Government | $29,733 | $38,210 | $39,790 |
| Industry | 28,354 | 38,550 | 40,980 |
| University | 25,685 | 31,890 | 34,950 |

Granted, there are proportionately more women working in the universities, but there are proportionately more PhDs in the universities, too, and we have demonstrated above that they draw substantially higher salaries. One could expect this latter factor to balance the former, but obviously it is not strong enough to bring the university pay scale into line with that of industry.

Salary increases for all R&D last year were much stronger in the middle ranges than they were a year earlier. More than 18% of men and women received no salary increase or raises of less than 2% in the earlier year. Last year only a little more than 12% fell into that below-inflation range. And, as we could report last year, women were much stronger in the large increase



portion of the table, suggesting that some repair is being made to the long-standing disparities. Here are the details:

**Salary increases by sex**

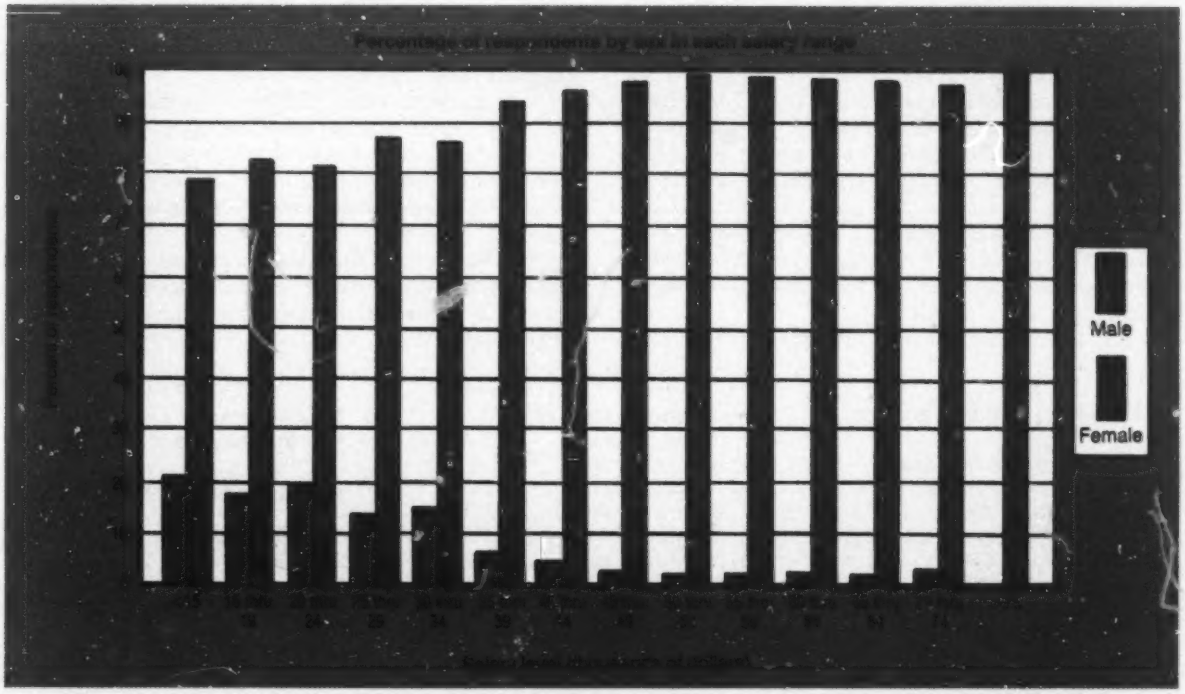
| Amount | 1983 % | | 1984 % | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| None | 16.3 | 15.6 | 9.4 | 8.6 |
| Less than 2% | 2.0 | 2.7 | 2.8 | 3.7 |
| 2 through 5% | 27.3 | 20.5 | 36.6 | 35.2 |
| 6 through 9% | 38.9 | 39.5 | 37.8 | 34.5 |
| 10 through 13% | 11.2 | 15.6 | 9.8 | 14.6 |
| 14% or more | 4.3 | 6.1 | 3.6 | 3.4 |

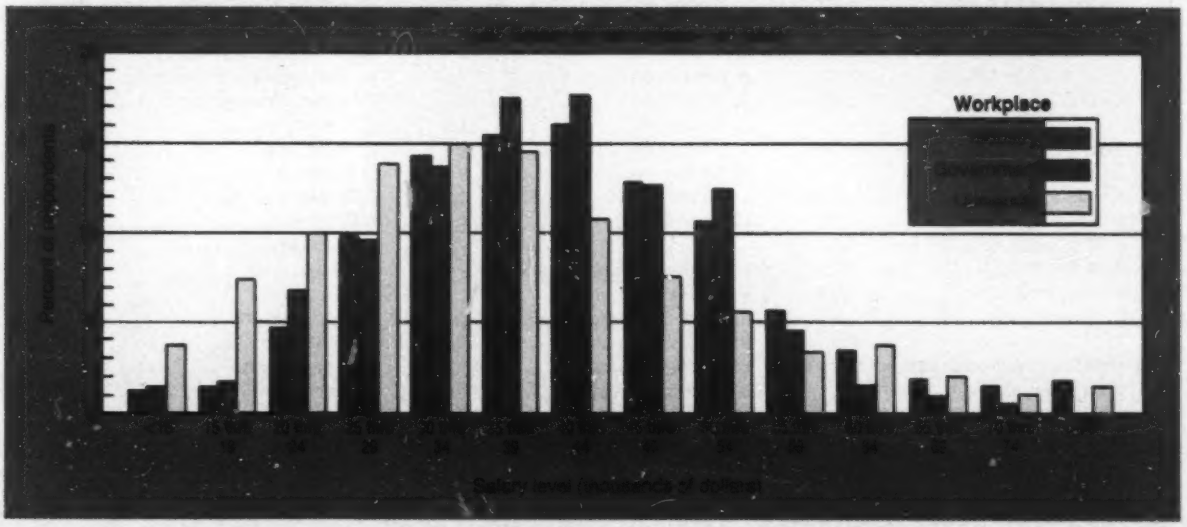
As we reported in Part I of this article, the ranges were changed on our salary questions, and the reasons were explained in detail. Where last year we reported on annual earnings above $31,000, this year we can only approximate a comparable report.

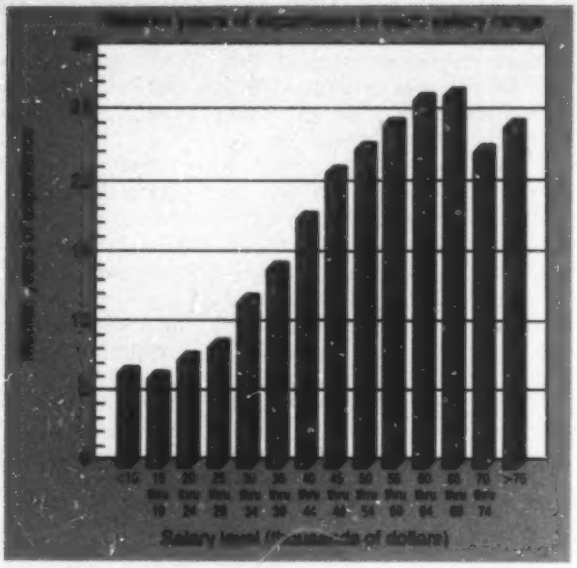
Last year some 37.7% of the women respondents were earning $31,000 per year or more. This year's women respondents report that 56.6% are earning $30,000 per year or more. Our interpolation puts the figure this year for $31,000 or more at near 51%, strikingly above that of a year ago.

Men dominate the upper salary ranges, as would be expected from all that has been said in these paragraphs about premiums paid for advanced degrees, age, and experience. More than 75% of male repondents last year were earning $31,000 per year or more. This year's figure is 80.4% earning $30,000 per year or more, with our interpolation putting those earning $31,000 or more at 77.6%. This is nowhere near the rate of increase that women showed.

As you would expect, our chart shows that women working in research, development, and quality assurance lag far behind men in work experience. Median





years of experience for males in R&D is 17.0 years, up from 16.73 last year and several previous years. For women, the median years of experience is 9.12, up from the 7.86 that had been reported in several previous years.

There is a large reservoir of experience among males in R&D, with 41.5% having more than 20 years' experience. This represents a continuation of small increases reported in recent years

Just over a third of that percentage, or 15.9% of the female respondents, report having 20 years' experience in their prese t work, approximately the same as in recent years.

The fact that many of the female respondents are young controls the experience figure. For a large portion, 20 years of experience would be impossible, since 71.1% are younger than 40 years of age. Only 43.7% of the men are that young.

One result of the younger age range for females is that there are fewer in the work force with PhDs. The percentage of female respondents this year with PhDs is 19.1, up substantially from last year's 14.8, and in line with earlier years. Of this year's male respondents, 34.4% report having a PhD, up from close to 32% in recent years.

The time spent with the same organization usually is a plus when it comes to salary. The fact that 5.9% of the male respondents have been with their present employer for more than 30 years helps to explain their higher positions in the organization and on the pay scales. Only 1.2% of this year's female respondents have the same longevity.

At the same time, 55.7% of this year's female respondents are reporting less than seven years with the same organization, down slightly from last year and in line with previous years. Only 37.5% of the males have been with their present employer for less than seven years.

A wealth of additional information about the men and women who work in research, development, and quality assurance is contained in the accompanying charts and tables. R&D

**1985 R&D Industry profile:**

**1. What is your annual salary?**

| | |
|---|---|
| a. Less than $15,000 | 1.6% |
| b. $15,000 to $19,999 | 2.0 |
| c. $20,000 to $24,999 | 5.7 |
| d. $25,000 to $29,999 | 10.3 |
| e. $30,000 to $34,999 | 14.2 |
| f. $35,000 to $39,999 | 15.5 |
| g. $40,000 to $44,999 | 15.7 |
| h. $45,000 to $49,999 | 12.2 |
| i. $50,000 to $54,999 | 10.2 |
| j. $55,000 to $59,999 | 5.1 |
| k. $60,000 to $64,999 | 3.3 |
| m. $65,000 to $69,999 | 1.6 |
| n. $70,000 to $74,999 | 1.2 |
| o. $75,000 or more | 1.5 |

**2. Your raise during the past year was ...**

| | |
|---|---|
| a. None | 9.3% |
| b. Less than 2% | 2.9 |
| c. 2 thru 5% | 36.6 |
| d. 6 thru 9% | 37.6 |
| e. 10% thru 13% | 10.1 |
| f. 14% or more | 3.6 |

**3. How long have your worked for your present employer?**

| | |
|---|---|
| a. Less than 1 year | 4.4% |
| b. 1 thru 3 years | 16.6 |
| c. 4 thru 6 years | 17.8 |
| d. 7 thru 9 years | 11.7 |
| e. 10 thru 12 years | 9.4 |
| f. 13 thru 15 years | 7.6 |
| g. 16 thru 18 years | 7.7 |
| h. 19 thru 21 years | 6.5 |
| i. 22 thru 24 years | 5.9 |
| j. 25 thru 27 years | 4.1 |
| k. 28 thru 30 years | 2.7 |
| m. 31 thru 33 years | 3.3 |
| n. 34 thru 36 years | 1.3 |
| o. More than 36 years | 1.0 |

**4. What is your age?**

| | |
|---|---|
| a. Under 26 | 2.2% |
| b. 26 thru 30 | 10.4 |
| c. 31 thru 35 | 15.5 |
| d. 36 thru 40 | 17.5 |
| e. 41 thru 45 | 14.9 |
| f. 46 thru 50 | 13.2 |
| g. 51 thru 55 | 11.6 |
| h. 56 thru 60 | 9.0 |
| i. 61 thru 65 | 4.3 |
| j. Over 65 | 1.4 |

**5. How many years of experience do you have?**

| | |
|---|---|
| a. Less than 1 year | 0.6% |
| b. 1 thru 5 years | 12.0 |
| c. 6 thru 10 years | 17.2 |
| d. 11 thru 15 years | 17.0 |
| e. 16 thru 20 years | 13.6 |
| f. 21 thru 25 years | 13.4 |
| g. 26 thru 30 years | 11.2 |
| h. 31 thru 35 years | 9.8 |
| i. 36 thru 40 years | 3.3 |
| j. More than 40 years | 1.9 |

**6. What is the highest degree you hold?**

| | |
|---|---|
| a. Less than bachelor | 7.1% |
| b. Bachelor | 34.2 |
| c. Master | 25.6 |
| d. Doctorate | 33.1 |

**7. What is your profession?**

| | |
|---|---|
| a. Chemist | 37.4% |
| b. Chemical engineer | 7.0 |
| c. Mechanical engineer | 9.3 |
| d. Electrical engineer | 8.9 |
| e. Aeronautical engineer | 1.5 |
| f. Industrial engineer | 1.1 |
| g. Physicist | 9.0 |
| h. Metallurgist | 5.2 |
| i. Biologist | 6.2 |
| j. Mathematician | 0.4 |
| k. Ceramist | 1.8 |
| m. Geologist | 1.5 |
| n. Other | 10.6 |

**8. Do you work in ...**

| | |
|---|---|
| a. Industry | 74.1% |
| b. Government | 15.1 |
| c. University | 10.9 |

**9. Are you ...**

| | |
|---|---|
| a. Male | 92.7% |
| b. Female | 7.3 |